

REMARKS

The Examiner is thanked for the due consideration given the application. This amendment is being filed concurrent with a request for continued examination

Claims 1-8, 12, 17 and 18 are pending in the application. Claims 1-7 have been withdrawn. Independent Claim 8 has been amended to improve the language in a non-narrowing fashion. Claims 17 and 18 have been newly presented for consideration on the merits.

No new matter is believed to be added to the application by this amendment.

Rejection Under 35 USC §112, Second Paragraph

Claim 8 has been rejected under 35 USC §112 second paragraph as being indefinite. This rejection is respectfully traversed.

The Office Action asserts that a limitation in claim 8 is unclear. The comments in the Office Action have been considered, and claim 8 has been accordingly amended.

Claim 8 is thus clear, definite and has full antecedent basis.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

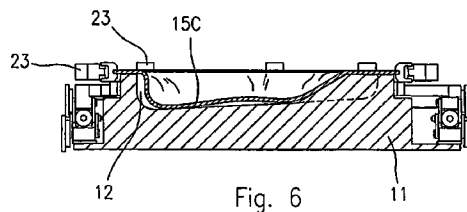
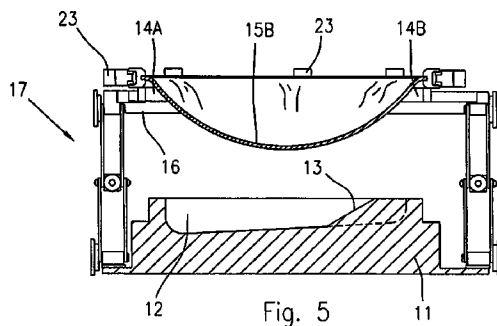
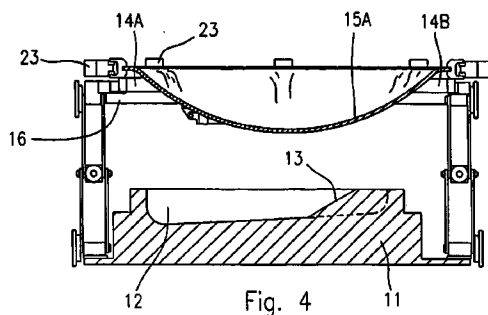
Art Rejection

Claims 8 and 12 have been rejected under 35 USC §103(a) as being unpatentable over BREITLING (DE 24 18 445) in view of

CHUN et al. (U.S. Patent 6,328,953), VAUGHN (WO 99/64221) and PLANETA (U.S. Patent 4,728,277).

This rejection is respectfully traversed.

The present application relates to a mold and clamping frame assembly, or more properly an apparatus for molding bodies (such as fuel tanks) by vacuum thermoforming plastic sheets of great thickness, to avoid a strong stretching and weakening in some critical areas of the molded article. This apparatus is shown, by way of example, in Figs. 4-6 of the application reproduced below.



As stated at pages 1 and 2 of the specification of the present application, in deepdrawing and thermoforming technology, the excessive stretching of the plastic sheets and weakening of the molded articles should be avoided, in particular for technical articles such as fuel tanks (page 2, lines 4-9).

In order to partially solve this problem, BREITLING suggests to pre-shape the plastic sheet by supporting the same sheet in a sagging condition by a clamping frame having mechanical clamping means.

To clarify also that in order to support a plastic sheet pending in a sagging condition from the clamping frame, the heavier the plastic sheet becomes (depending on the dimension and thickness of the same sheet), the stronger is the required retaining force.

The vacuum clamping of a plastic sheet is more critical than mechanical clamping. Furthermore vacuum clamping is important for large sheets of greatest thickness, for example in molding fuel tanks (page 2) which require composite and costly plastic sheets.

In the event that the vacuum clamping frame, due to the weight of the sagging sheet and the drawing force in the thermoforming mold, does not provide a required retaining force along the edges, defective and expensive articles will be molded that will be rejected with consequent economical lost.

Therefore the technical problem to be solved is to provide a mold and clamping frame assembly for molding and thermoforming bodies in plastic material, conformed to allow a pre-shaping of a heated plastic sheet in a raised condition above the mold and, at the same time, include a vacuum clamping frame conformed and arranged to provide an improved airtight action and a strong vacuum retaining force.

The Technical Effect

As previously discussed, the technical effect provided by an assembly according to the present invention, which includes a vacuum clamping frame for holding the plastic sheet along peripheral edges, achieves:

a) A strong suction force by Venturi effect inside the two slots 27 upstream a Venturi restriction to retain plastic sheet heated to a softening condition, to achieve:

b) A double airtight action due to:

b1 - penetration of the heated plastic material into the slots; and

b2 - penetration of the side walls and the intermediate baffle 28 (partition) into the thickness of the same plastic sheet.

A comparison with PLANETA can be better understood by considering the drawing below.

US 4,728,277

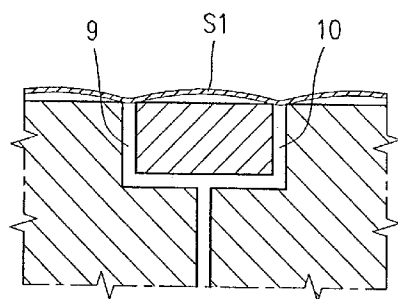


Fig. A

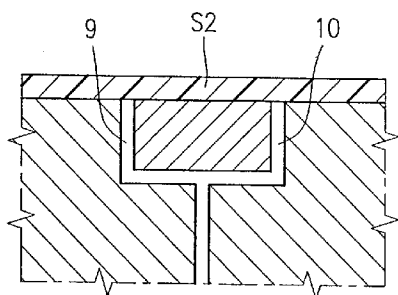


Fig. B

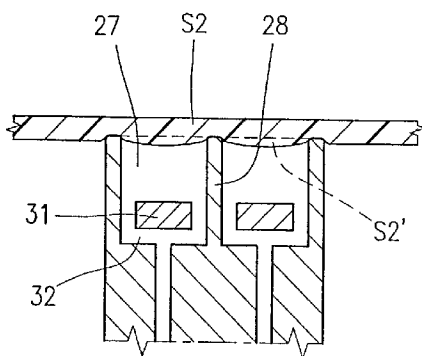


Fig. C

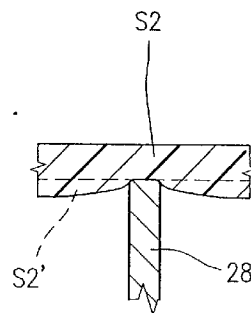


Fig. C2

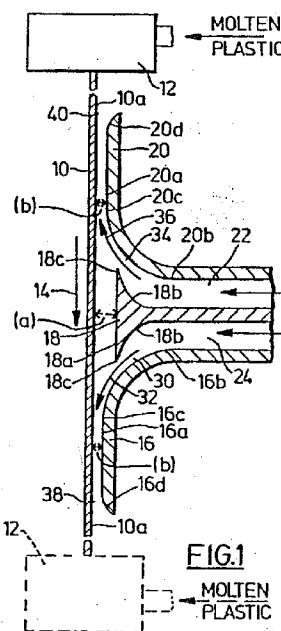


Fig. D

Fig. A shows a vacuum clamping frame that includes two spaced apart suction slots 9, 10 to retain a thin and flexible plastic sheet S1.

Fig. B shows the frame of Fig. A, for retaining a sheet S2 having a thickness three or more times greater than S1.

Fig. C1 shows the vacuum frame of figure 9 of the present application for retaining a sheet S2, as per Fig. B;

Fig. C2 is an enlarged detail of fig. C1.

In Fig. A, the air flow paths 9 and 10 open directly on a flat resting surface for the sheet S1.

One can see from Fig. A that, in case of a thin flexible sheet S1, such as the flexible film of PLANETA, the film is merely sucked into the slots to close both flow paths 9 and 10, providing a low vacuum force to retain the thin sheet S1.

In Fig. B a sheet S2 of greater thickness is shown. Due to its thickness and resulting greater rigidity, no penetration of the sheet into the flow paths 9 and 10 is made possible. Furthermore, air may be sucked through an air gap between the facing surfaces of the sheet S2 and the upper surface of the frame, compromising the airtight - None or a very low vacuum force is therefore obtained for retaining the sheet S2.

Conversely in Fig. C1 and Fig. C2 according to present application, compared to Fig. B, a double airtight action is obtained as previously stated at point "b", causing penetration of the side walls of the slots 27, and the intermediate baffle 28, into the thickness of the heated plastic sheet S2, as well as penetration of the heated plastic material S2' into the same slots 27, tightly clamping and firmly retaining the plastic sheet urged against the peripheral edge of the clamping frame.

Furthermore, as clearly depicted in the enlarged view of figure 9 of the patent application, bars 31 are arranged inside the slots 27 close to the bottom. Therefore, as set forth in the instant claims, the bars 31 define a narrow air flow passage 32, to provide, at the beginning of the clamping step, a strong air suction and consequently high reduced pressure conditions in the same slots, due to Venturi effect, in the same slot **upstream** the constricted section of the flow path.

A strong vacuum retaining force is therefore achieved for the plastic sheet S2, clamped in a **"static condition"**, preventing any movement of the plastic sheet in respect to the clamping frame.

The arrows in Fig. C1, represent the air flow sucked from the outside, into the slots 27 and into the manifold of the clamping frame.

Conversely PLANETA discloses the Venturi effect in a **"dynamic condition", for a different scope**, and in a **different mode**, as is explained below.

As clearly stated in the abstract and in the specification, PLANETA relates to "a film-handling device **for stabilizing a vertically movable thin flexible film** moved along a vertical path" (see column 1, lines 14 to 39).

The goal of PLANETA is to stabilize the movement of the thin plastic film (column 2, lines 57-61) relative to the handling device, "without the possibility of the film contacting

the device because of intervening (environment) air streams" (see column 5, lines 18-25).

Conversely, the present invention provides an assembly comprising a "vacuum actuate clamping device" **to firmly retain** a plastic sheet in **a stationary condition**, by an articulated clamping device, to allow pre-shaping and prevent pre-stretching of the plastic sheet during molding.

Consequently the scope of PLANETA completely differs from the scope of the present application.

The device of PLANETA, and the use of Venturi effect also, differ from the present application.

As shown in Fig. C1 above, and in Fig. 9 of the present invention (reproduced in original form below), the air flow is sucked from the outside, into the slots 27 and into a manifold, **by connecting the manifold to a vacuum pump or source**. The present invention generates a vacuum degree or strong air suction, **upstream the Venturi** restriction provided by the inner bars 31, as well as to cause penetration of the plastic material into the same slots, to air-tightly close the same slots and retain the plastic sheet in a stationary condition.

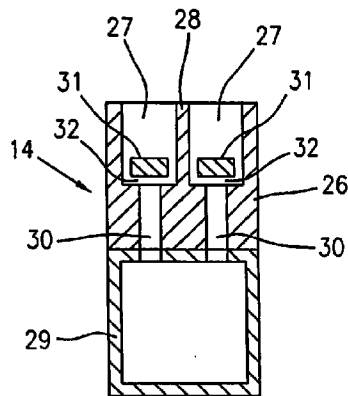


Fig. 9

Conversely, in PLANETA the handling device is connected to a **pressure air source** causing the cooling air to flow out against the movable plastic film.

The air feeding channels are provided with a restriction to generate a small vacuum **due to injected air, downstream the Venturi restriction**, to stabilize the moving plastic film, preventing the same moving film to come in contact with the handling device (column 5, lines 19 to 43).

This is clearly shown by comparing Fig C1 with Fig D in the drawing above on page 12 of this paper.

Now compare this applied art to claim 8 of the present invention.

- Claim 8 recites the use of two air suction slots, while PLANETA discloses two **air injecting slots**, in a completely different device, for a different purpose.

- Claim 8 recites the use of a bar having a width smaller than and spaced apart from the bottom of the slot, to provide a Venturi restriction causing a strong air suction upstream the Venturi restriction. See also new claim 17 of the present invention.

Summarizing, PLANETA does not disclose the use of a suction force to clamp and keep stationary a plastic sheet. PLANETA discloses the use of low pressure generated by an injected air flow, to stabilize a movable film downstream a restriction. Consequently, the subject matter of claim 8 differs from the teachings of BREITLING and PLANETA, summarizing, due to different static and dynamic situations, it is impossible to combine the teaching of both patents.

That is, the two cited documents in practice cannot be combined because of incompatibility of disclosed features essential to the invention.

That is, BREITLING relates to a device for working a sheet of plastic material to conform the same by ***vacuum molding***.

On the other hand, PLANETA relates to the production of tubular or continuous flat film to be wound on a roll for a successive use, specifically blowing a tubular plastic film.

Both cited prior documents are thus completely differing from each other under the technological point of view or use.

It is thus impossible to modify the teachings of BREITLING to include the teachings of PLANETA, unless to provide the clamping device of BREITLING with air jets and Venturi effect for an unknown purpose.

In summary, the applied art references do not render *prima facie* unpatentable a claimed embodiment of the present invention.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

CONCLUSION

The issuance of a Notice of Allowability is respectfully solicited.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Robert E. Goozner/
Robert E. Goozner, Reg. No. 42,593
Customer No. 00466
209 Madison Street, Suite 500
Alexandria, VA 22314
Telephone (703) 521-2297
Telefax (703) 685-0573
(703) 979-4709

REG/fb